

CRUISE REPORT
SOVIET RESEARCH VESSEL MYS BABUSHKINA
CRUISE NO. 89-01
BERING SEA
MIDWATER TRAWL SURVEY
OF
WALLEYE POLLOCK
(THERAGRA CHALCOGRAMMA)

PREPARED
BY
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CRUISE PERIOD, AREA, AND SCHEDULE

Resource Assessment and Conservation Engineering Division (RACE) scientists participated in a USSR/US cooperative midwater trawl survey of walleye pollock (Therasra chalcosramma) aboard the Soviet research vessel Mys Babushkina in the Aleutian Basin and eastern Bering Sea from March 9 to April 6, 1989. The vessel's itinerary was as follows:

March 9	Arrive on vessel.
March 9-10	Transit to survey start. Two hauls were conducted near the Pribilof Islands enroute.
March 11	Start of survey.
April 2	End of survey.
April 6	Arrive in Kodiak, Alaska. Disembark scientists.

OBJECTIVES

The principle objectives of the cruise were to:

1. Collect biological samples of pollock, stock, age structures, lengths, sexual maturity, blood samples, and whole fish.
2. Collect relative density information of pollock stock along the transect route.
3. Collect data on distribution of ichthyoplankton in the eastern Bering Sea.

VESSEL, OCEANOGRAPHIC EQUIPMENT, AND TRAWL GEAR

The Mys Babushkina is an 84 meter large refrigeration stern trawler (BMRT) equipped for oceanographic and fisheries research.

Echo sign was sampled using a pelagic trawl PT 108/528. The trawl consisted of a 75 meter dandyline, circular trawl doors with a diameter of 6 meters weighing 1764 kilograms, and a codend mesh size of 10 millimeters. The vertical and horizontal openings of the trawl were 12 and 22 meters, respectively. On two occasions a bottom trawl was used, which was similar in design to the PT 108/528 trawl gear.

Relative density of walleye pollock was collected using a Furuno echo sounder.

The depth profile of the water temperature was collected using Nansen bottles. The surface temperature was collected using a bucket thermometer.

SURVEY AND DATA COLLECTION METHODS

Survey operations were carried out on a 24 hour schedule. Ichthyoplankton and water samples were taken when the vessel arrived on station. The trawls were normally conducted between 0900 and 2200 hours Alaska Standard Time (AST) when the fish weren't dispersed.

Pelagic trawls were made along the transect line when fish sign was seen in sufficient quantities to capture enough fish for biological sampling purposes. Trawl durations were 30 to 60 minutes, but could last longer if no visible sign was entering the net. The average trawl towing speed was 3.0 knots.

The procedure for determining species composition varied with trawl size. If the trawl was less than two tons, it was whole haul sampled. For those greater than two tons, a sub-sample was taken. The sub-sample weight relative to the total haul was determined by visual means. The sample weights were determined by weighing baskets of fish on a tared scale.

A sub-sample of fish, to be used for length frequencies, was removed after the initial weighing. These fish were sexed and reweighed and an average weight was determined for each sex. Due to differences in measuring systems, the length frequencies were carried out separately by the two scientific teams. RACE scientists rounded the length to the nearest centimeter, while the TINRO (Pacific Research Institute of Fisheries and Oceanography, Vladivostok) scientists rounded down to the nearest centimeter. For example, 3.8 cm would be 4.0 cm for RACE and 3.0 cm for TINRO. The fish used for length frequencies were returned to the Soviet scientists for analysis. More fish were collected for independent projects by the US scientists, when available. These projects consisted of collecting data from 30 fish for length, weight, otoliths and gonad maturity from each trawl. Adult pollock were collected and frozen for morphometric analysis. Age structures and ovaries were collected from the northern, western, and southern areas of the Aleutian Basin and eastern Bristol Bay. Blood samples were also taken from pollock in the Aleutian Basin for the University of Alaska, Fairbanks (Table 1).

Relative density readings of pollock concentrations were recorded using the Furuno echo sounder on the vessel's bridge. Readings were taken hourly, except when the ship was stationary or a trawl was being sampled (Figure 1).

RESULTS

The survey consisted of 20 transects, excluding cross-

transects (Figure 2). During the survey 19 midwater trawls were completed (Table 2 and Figure 3).

The trawl data results indicated, that walleye pollock occurred 19 times and accounted for 65% of the total catch weight, and 48% of the total number of fish caught (Table 3 and Table 4). Yellowfin sole was next accounting for 22% of the total catch weight, and 40% of the total number of fish.

Female pollock comprised 54% of the total catch of pollock in the midwater hauls targeted on adult fish sign. Percent composition of female pollock in these catches ranged from a low of 12% to high of 90%.

In analyzing the length data the Bering Sea was separated into 3 areas, the Northwest, Southeast, and Aleutian Basin regions. The Northwest region consisted of the shelf area northwest of the southeastern part of St. George Island, and extending to the 1,000 meter contour depth. The Southeast region consisted of the shelf area southeast of St. George Island, and extending to the 1,000 meter contour depth. The Aleutian Basin region consisted of depths greater than 1,000 meters.

The pollock in the Northwest region ranged in length from 30 cm to 56 cm for males and from 28 cm to 53 cm for females. The average length was 38.8 cm for males and 39.2 cm for females (Figure 4). In the Southeast region the pollock ranged in length from 35 cm to 67 cm for males and from 35 to 77 cm for females. The average length was 43.8 cm for males and 46.6 cm for females (Figure 5). The pollock found in the Aleutian Basin region ranged in length from 38 to 57 cm for males and from 41 cm to 58 cm for females. The average length for males was 47.7 cm and 49.3 cm for females (Figure 6). The overall average length for females was 49.6 cm as compared to 46.7 cm for males.

Actively spawning pollock were found in 18 of the 2607 females examined and in 18 of the 2249 males examined.

Relative density distributions were conducted during the trawl survey. Significant concentrations of fish occurred at the following areas:

1. 54-58.5N 175-52.3W to 55-30.0N 174-28.0W
2. 53-29.7N 170-52.1N to 54-18.5N 174-48.3W
3. 55-33.4N 164-41.1W to 55-26.5N 164-20.4W

The pollock sign observed during these relative density reading ranged from a depth of 34 to 101 meters; however, all trawls were conducted at depths ranging from 60 to 410 meters.

STANDARDIZATION AND THE VALIDITY OF DATA

The need for a standardized method of data collection on multi-national research cruises is necessary in order to eliminate the duplication of work, which occurred in the collection of length frequency data. Also during this survey, it would have eliminated irregularities associated with the data

collection which included the recording of weights, taring scales, haul weight distortions, average fish weights, and sorting the catch.

One of the irregularities resulted from the scientific equipment on the vessel being American and designed to measure in British units. The Soviet scientists being unfamiliar with this system recorded 14 pounds and 14 ounces as 14.1 pounds.

Another irregularity was taring the scales. The scales were tared for a specific basket weight, but large fish would be weighed without a basket, resulting in the weight loss of about 1.5 to 2.0 pounds per fish.

Incorrect extrapolation methods resulted in haul weight distortions. An example of this occurred when haul 19 was partially whole-haul sampled for species composition. The Assistant Chief Ichthyologist determined that 15% of the haul had been sampled by a visual estimation. However, 15% was not used in the extrapolation, but 1/15 or 6.7%, which resulted in the haul being extrapolated to 42 tons, instead of 13 tons. The raw data was obtained for all trawls, and recalculated in Seattle at the end of the cruise.

Average weights determined by the Soviets were incompatible with RACE methods. Average fish weight was determined after the fish had been sexed, and which resulted in loss of body fluids and in some instances body organs. When possible independent average weight determinations were made.

Other irregularities encountered were the discard of incidental catch before it was weighed such as jellyfish and squid. Using the non-biological staff to assist in species composition sampling of large trawls, resulted in combining two or more species of fish together, such as rock sole and flathead sole and small Pacific cod with walleye pollock.

When each of these irregularities were encountered, steps were taken to correct the situation in order to ensure that proper sampling procedures were being followed during the course of the cruise.

SCIENTIFIC PERSONNEL

<u>Name</u>	<u>Position</u>	<u>Organization</u>
V. M. Paschenko	USSR Chief Scientist	TINRO
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A. V. Lipinsky	USSR Scientist	TURNIF
A. M. Salov	USSR Scientist	TURNIF
V. G. Ruban	USSR Scientist	TURNIF
I. B. Protasenko	USSR Asst. Scientist	TURNIF
N. V. Fedorov	USSR Asst. Scientist	TURNIF
V. V. Martinov	USSR Asst. Scientist	TURNIF
P. I. Reznichenko	USSR Asst. Scientist	TURNIF
A. M. Privalihin	USSR Asst. Scientist	VNIPO
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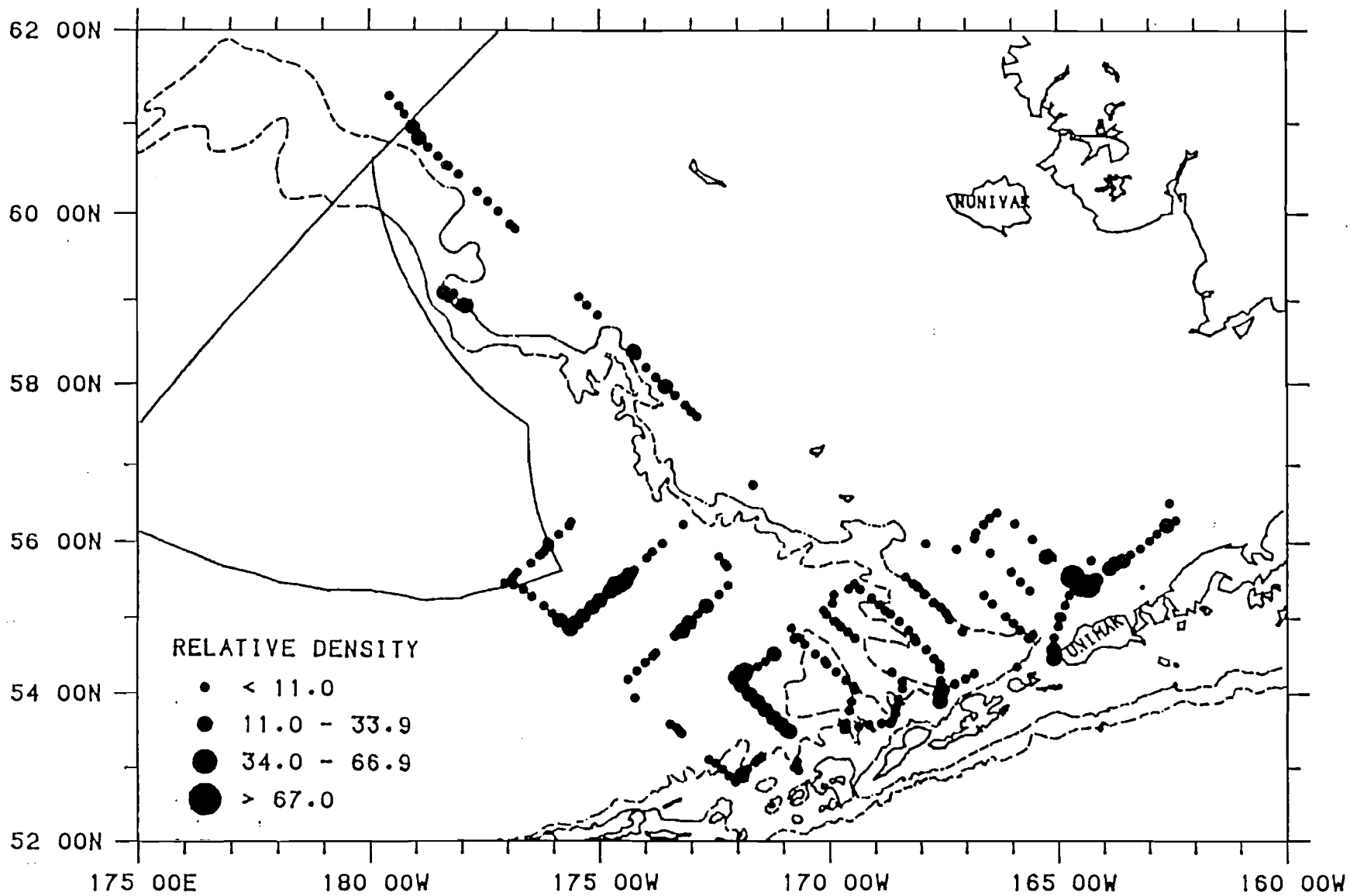


Figure 1. Relative density distribution of pollock from the Spring 1989 R/V Mys Banbushkina Bering Sea trawl survey.

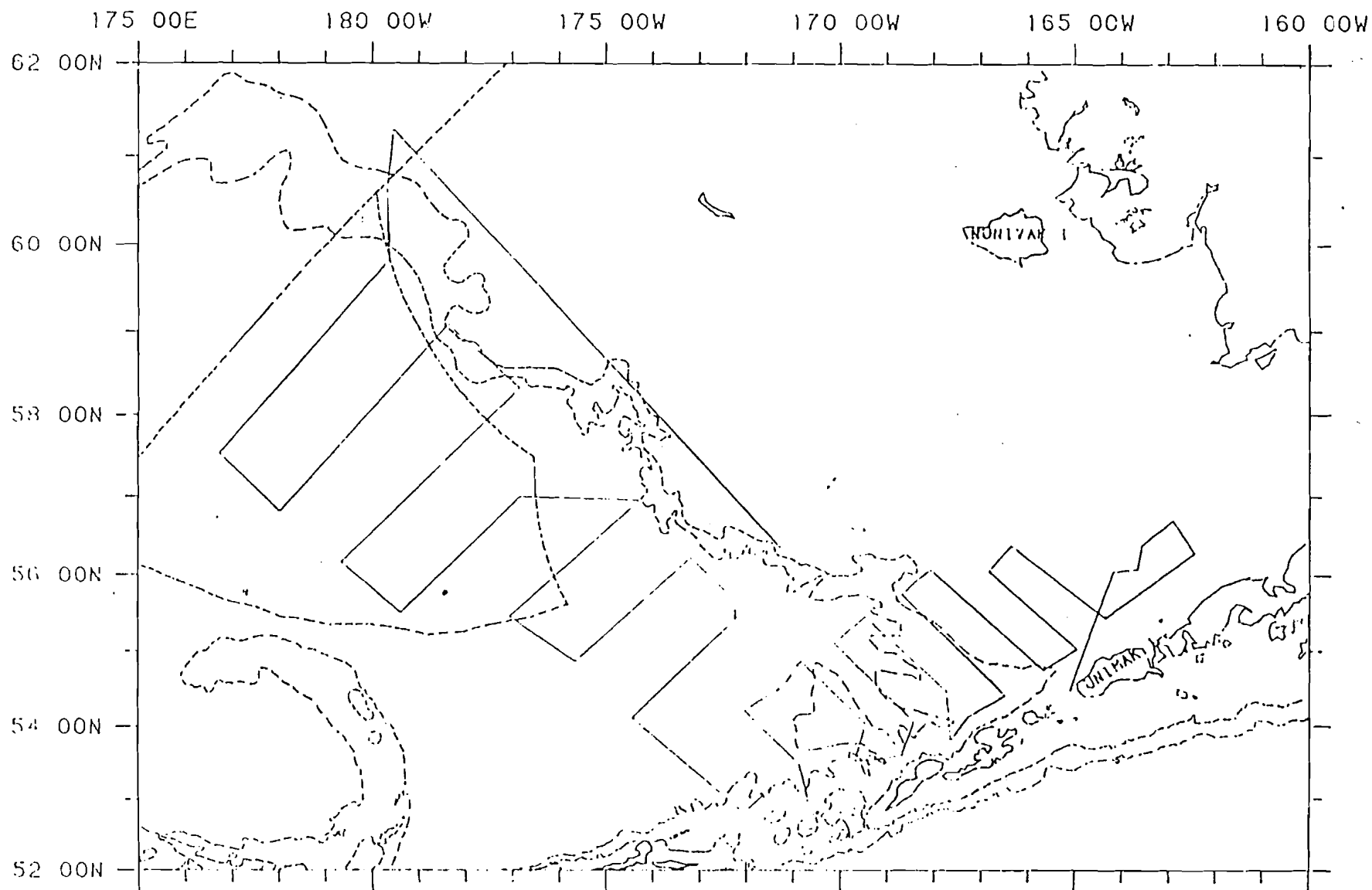


Figure 2. Transect line of the Spring 1989 R/V Mys Babushkina Bering Sea trawl survey.

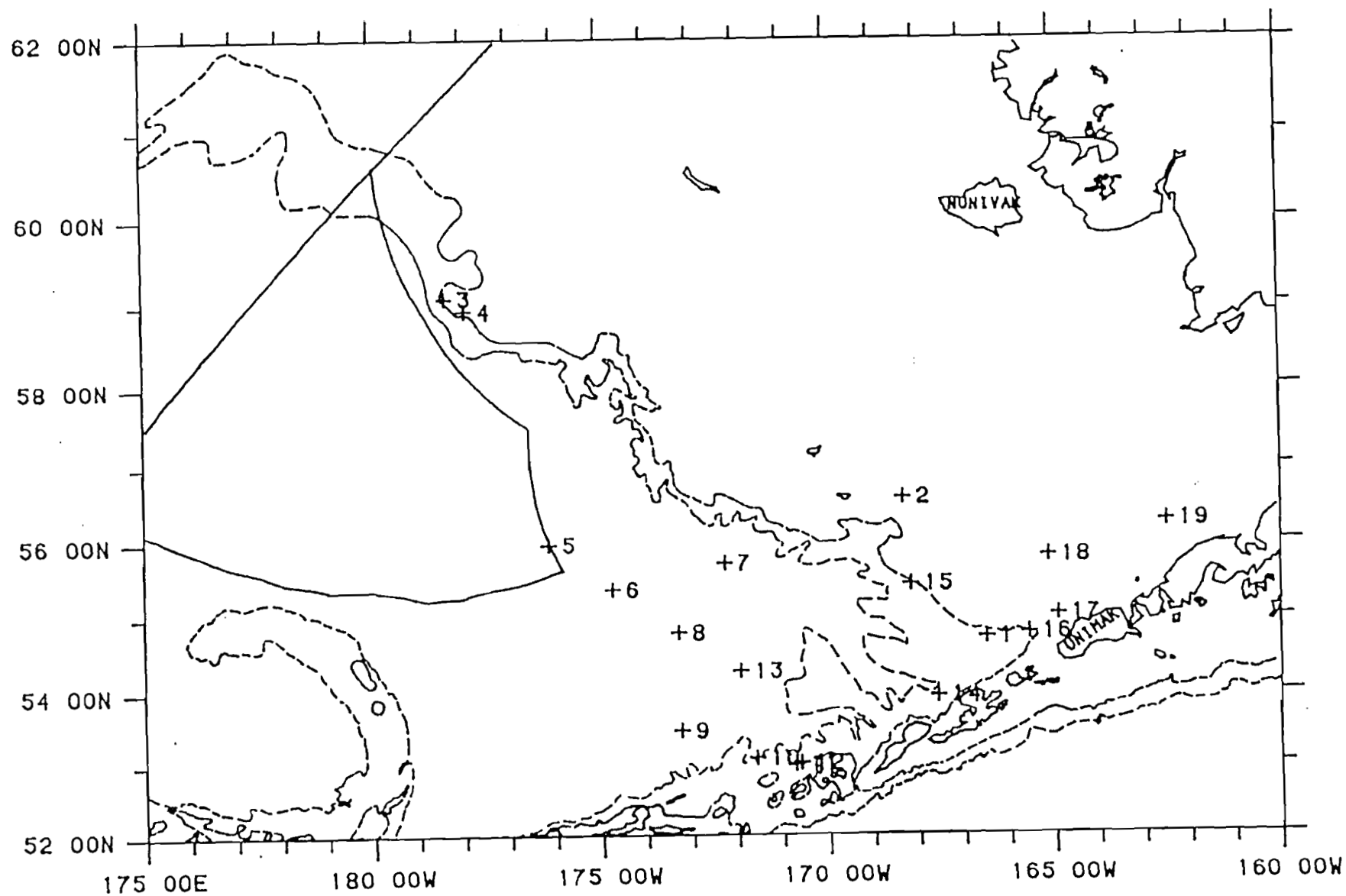


Figure 3. Haul positions of the Spring 1989 R/V Mys Babushki Bering Sea trawl survey.

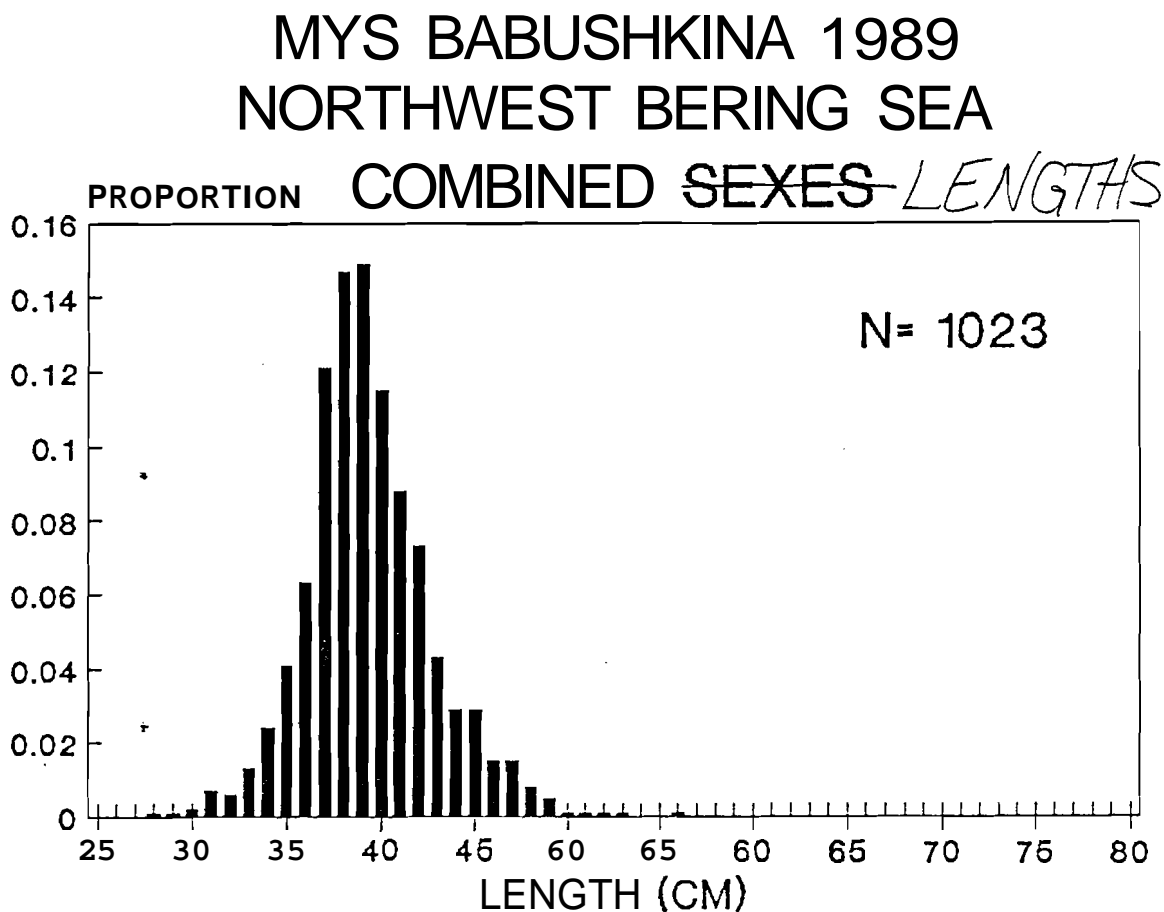
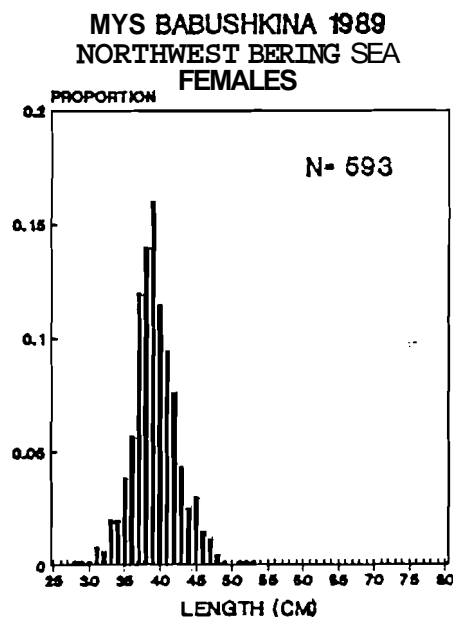
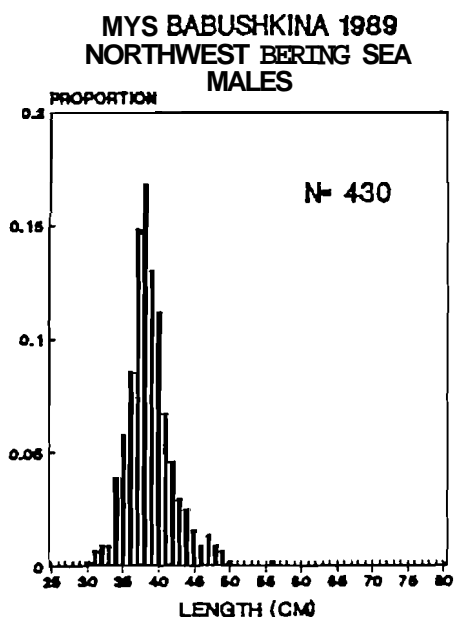


Figure 4. Unweighted length frequency distribution of pollock in the Northwest region of the Bering Sea from the Spring 1989 R/V Mys Babushkina trawl survey.

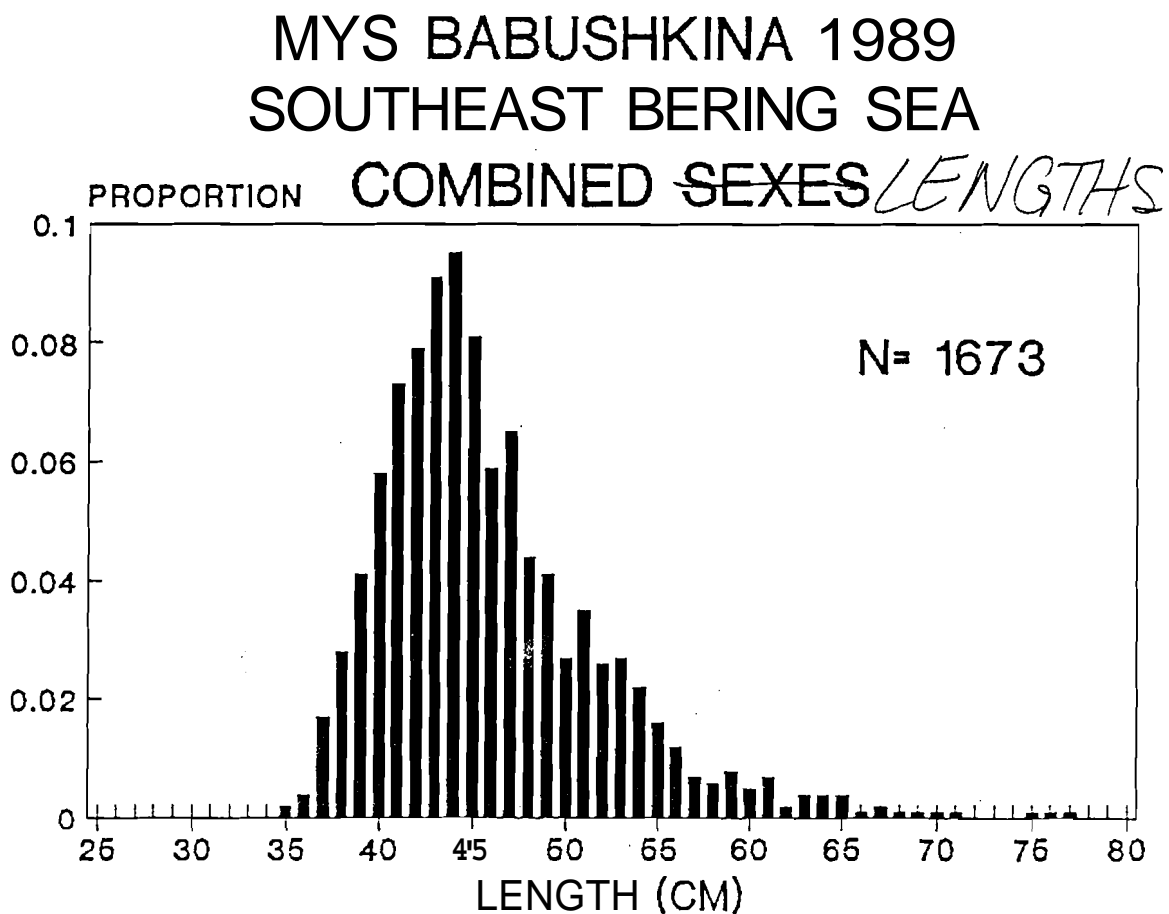
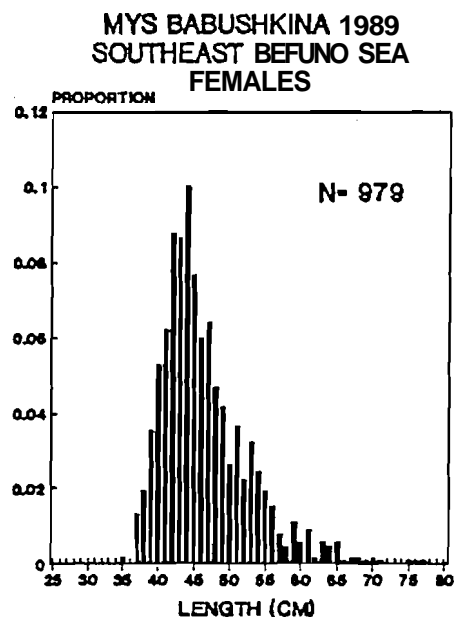
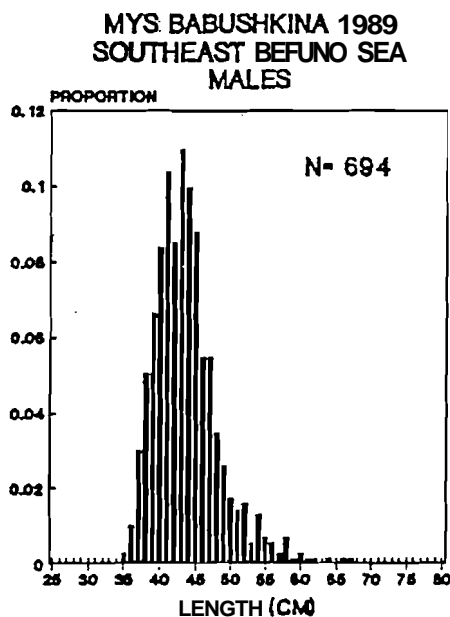


Figure 5. Unweighted length frequency distribution of pollock in the Southeast region of the Bering Sea from the Spring 1989 R/V Mys Babushkina trawl survey.

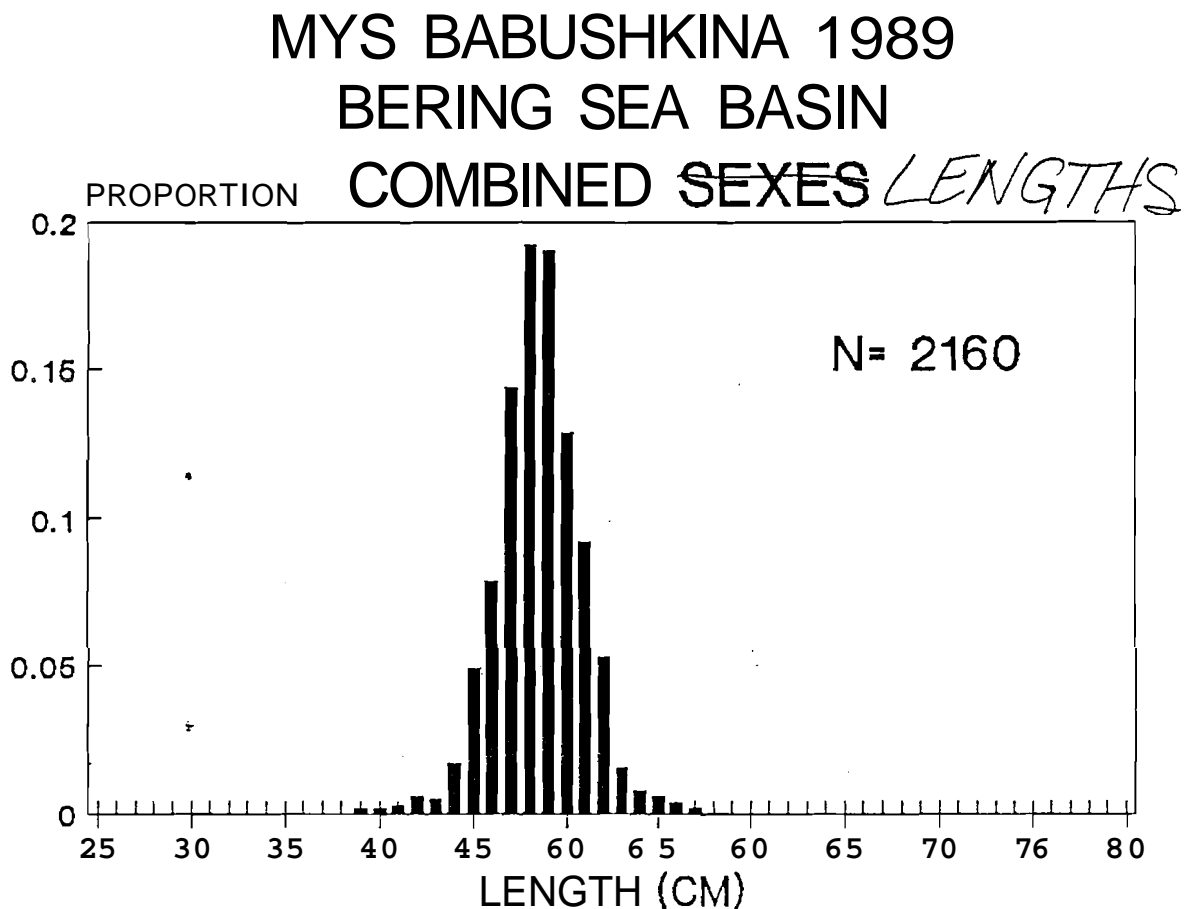
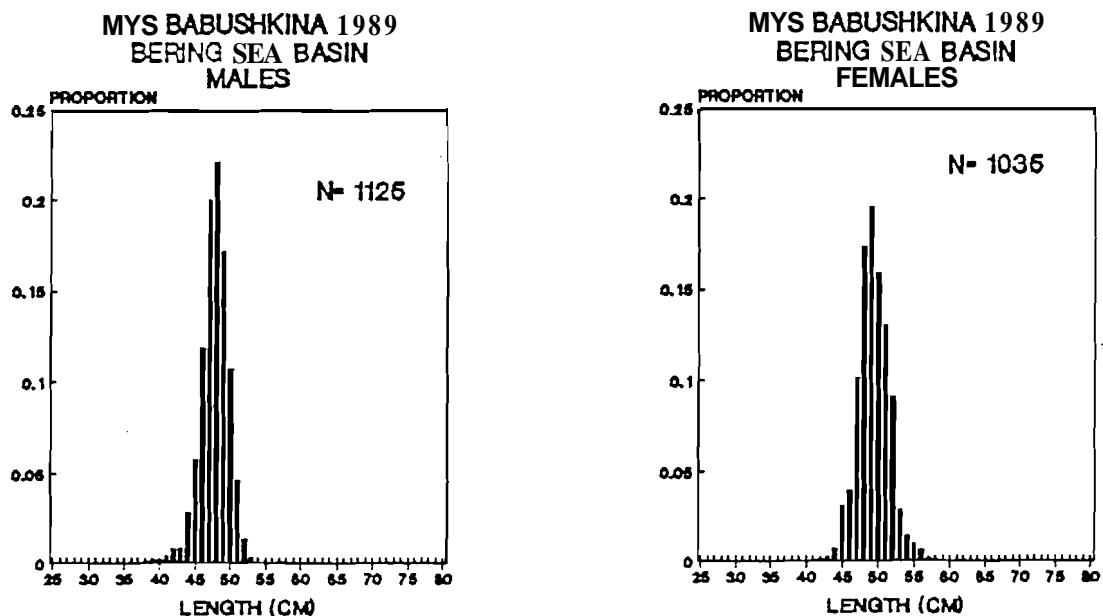


Figure 6. Unweighted length frequency distribution of pollock in the Aleutian Basin region of the Bering Sea from the Spring 1989 R/V Mys Babushkina trawl survey.

Table 1. Biological samples and measurements summary data of the Spring 1989
R/V Mys Babushkina 1989 Bering Sea trawl survey.

Haul Number	Lengths	Maturity	Otoliths	Weights	Whole Fish	Genetic Samples
1	273	0	0	0	0	0
2	273	30	30	30	0	0
3	431	30	30	30	0	0
4	652	30	30	30	0	0
5	78	0	0	0	0	0
6	281	60	60	60	0	10
7	234	30	50	50	0	20
8	265	30	30	30	0	0
9	329	60	80	80	0	20
10	332	30	30	30	0	0
11	228	30	30	30	0	0
12	256	30	30	30	0	0
13	314	30	30	30	0	0
14	183	0	0	0	0	0
15	173	30	30	30	0	0
16	369	30	30	30	0	0
17	421	30	30	30	50	0
18	284	30	30	30	0	0
19	137	0	0	0	0	0
Totals	5,513	510	550	550	50	50

Table 2. Trawl station and catch summary data of the Spring 1989 R/V Mys Babushkina Bering Sea trawl survey.

Haul Number	Date 1989	Time (AST)	<u>Start Position</u>		Depth (fm) Gear/Bottom	Walleye Pollock	<u>Catch (Pound/Number)</u>		Other Species
			Latitude (North)	Longitude (West)			Flatfish		
1	10 Mar	2125-2225	54 44.1	166 30.7	126/ 148	3,077/2,287	1/	2	22/ 3
2	11 Mar	1130-1215	56 35.2	168 19.6	55/ 61	5,463/3,934	109/	116	410/ 83
3	16 Mar	0935-1105	59 05.0	178 22.0	109/ 127	357/ 401			
4	16 Mar	1555-1625	58 56.1	177 56.0	109/ 131	4,630/5,894			
5	20 Mar	1300-1400	55 58.3	176 08.1	98/1969	121/ 78			64/ 39
6	21 Mar	0930-1100	55 22.0	174 43.9	74/1915	3,885/2,587			29/ 13
7	22 Mar	1010-1120	55 42.8	172 16.6	74/1751	4,510/2,934			
8	22 Mar	2110-2210	54 48.4	173 17.5	33/1641	5,106/3,392			16/ 8
9	23 Mar	1925-2030	53 29.0	173 15.0	93/1942	5,123/3,417			4/ 2
10	24 Mar	0930-1100	53 05.2	171 36.0	224/1176	7,080/4,495			7/ 3
11	24 Mar	1520-1620	52 59.5	170 44.5	93/ 645	3,404/2,005			
12	24 Mar	1830-1930	53 01.0	170 37.8	219/ 739	5,372/3,354			333/3,577
13	25 Mar	0905-1005	54 17.2	171 55.9	32/1860	1,687/1,148			4/ 1
14	28 Mar	1610-1630	53 57.0	167 35.3	***/ 793	972/ 682			
15	29 Mar	1250-1350	55 25.8	168 10.0	82/ 137	259/ 177			
16	30 Mar	1300-1335	54 47.4	165 34.0	98/ 118	6,494/5,228			27/ 4
17	30 Mar	1840-1910	55 01.8	164 55.0	59/ 59	2,616/2,284	2/	4	122/ 16
18	31 Mar	1850-1950	55 48.1	165 07.6	49/ 55	9,820/4,818	9,079/	9,675	629/ 113
19	1 Apr	1155-1230	56 16.0	162 31.0	42/ 43	377/ 299	27,073/	42,986	401/ 207

***Gear problem--trawl depth unknown

Table 3. Frequency of occurrence by species of the Spring 1989
R/V Mys Babushkina Bering Sea trawl survey.

Species	Frequency	Percent
Walleye Pollock (<i>Theragra chalcogramma</i>)	19	100
Smooth Lumpsucker (<i>Aptocyclus ventricosus</i>)	9	47
Pacific Cod (<i>Gadus macrocephalus</i>)	6	32
Flathead Sole (<i>Hippoglossiodes elassodon</i>)	5	26
Rock Sole (<i>Lepidopsetta bilineata</i>)	3	16
Pacific Halibut (<i>Hippoglossus stenolepis</i>)	3	16
Chinook Salmon (<i>Oncorhynchus tshawytscha</i>)	3	16
Alaska Plaice (<i>Pleuronectes quadrituberculatus</i>)	2	11
Poacher Unidentified (<i>Agonidae</i>)	2	11
Sculpin Unidentified (<i>Cottidae</i>)	2	11
Arrowtooth Flounder (<i>Atheresthes stomias</i>)	2	11
Yellowfin Sole (<i>Limanda aspera</i>)	1	5
Lanternfish Unidentified (<i>Myctophidae</i>)	1	5
Jellyfish Unidentified (<i>Scyphozoa</i>)	1	5
Starry Flounder (<i>Platichthys stellatus</i>)	1	5
Skate Unidentified (<i>Rajidae</i>)	1	5
Grenadier Unidentified (<i>Macrouridae</i>)	1	5
Red King Crab (<i>Paralithodes camtschatica</i>)	1	5
Eelpout Unidentified (<i>Zoarcidae</i>)	1	5
Opilio Tanner Crab (<i>Chionoecetes opilio</i>)	1	5

Table 4 Summary of catch by species of the Spring 1989 R/V Mys Eaboshkina Bering Sea trawl survey.

Species	Numbers	Percent	Weight (Pounds)	Percent
Walleye Pollock (<i>Theragra chalcogramma</i>)	49,360	46.5	70,353.5	64.7
Smooth Lumpsucker (<i>Aptocyclus ventricosus</i>)	73	.1	150.9	.1
Pacific Cod (<i>Gadus macrocephalus</i>)	153	.1	998.4	.9
Flathead Sole (<i>Hippoglossoides elassodon</i>)	2,745	2.6	2,931.4	2.7
Rock Sole (<i>Lepidopsetta bilineata</i>)	7,687	7.2	6,498.8	6.0
Pacific Halibut (<i>Hippoglossus stenolepis</i>)	21	<.1	112.6	.1
Chinook Salmon (<i>Oncorhynchus tshawytscha</i>)	3	<.1	8.8	<.1
Alaska Plaice (<i>Pleuronectes quadrituberculatus</i>)	1,668	1.6	2,895.8	2.7
Poacher Unidentified (<i>Agonidae</i>)	82	.1	10.7	<.1
Sculpin Unidentified (<i>Cottidae</i>)	127	.1	371.2	.3
Arrowtooth Flounder (<i>Atheresthes stomias</i>)	26	<.1	42.0	<.1
Yellowfin Sole (<i>Limanda aspera</i>)	40,584	38.2	23,662.3	21.8
Lanternfish Unidentified (<i>Myctophidae</i>)	3,575	3.4	315.0	.3
Jellyfish Unidentified (<i>Scyphozoa</i>)	44	<.1	100.9	.1
Starry Flounder (<i>Platichthys stellatus</i>)	52	<.1	121.0	.1
Skate Unidentified (<i>Rajidae</i>)	4	<.1	81.9	.1
Grenadier Unidentified (<i>Macrouridae</i>)	2	<.1	17.6	<.1
Red King Crab (<i>Paralithodes camtschatica</i>)	1	<.1	10.8	<.1
Eelpout Unidentified (<i>Zoarcidae</i>)	2	<.1	1.1	<.1
Opilio Tanner Crab (<i>Chionoecetes opilio</i>)	3	<.1	0.4	<.1
Totals	106,212	100.0	108,685.1	100.0